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A Revision of the North American Species of Paria Lec. (Coleoptera:Chrysomelidae)

By

JOHN A. WILCOX
Associate Curator



NEW YORK STATE MUSEUM
AND SCIENCE SERVICE

BULLETIN NUMBER 365

The University of the State of New York

The State Education Department

Albany, N. Y.

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A REVISION OF THE NORTH AMERICAN
SPECIES OF *PARIA* LEC.
(COLEOPTERA:CHRYSOMELIDAE)

By
JOHN A. WILCOX, *Associate Curator*

INTRODUCTION

"The great number of published records indexed under the name *Paria canella* presents an example of misapplied taxonomy as well as of misdirected or inadequate observation and sampling of economic infestations. These chaotic records can now be partially analyzed and ascribed in many cases to the proper species. Fundamental beneath the problem lies the unit species concept which varies with the available evidence. Several of the names were given merely for convenience in arranging cabinet specimens according to their color combinations and seem not to reflect any taxonomic interpretation of natural species. They cannot, however, be rejected and must be used as or synonymized under the name proper to the natural species to which the type specimen may belong.

"In *Paria*, and in many other groups, the species can rarely be exemplified by individual beetles because of the great variability encountered in many of the common species. The frequent misconception is that such variability is proof that species do not exist as distinct entities in the genus. The proofs of specific status are, however, to be found in the living populations. Only when these are known can we devise a stable and satisfactory classification of the species in the genus."

The above statements are taken from the manuscript notes prepared by the late H. S. Barber. The biology of only one species is well known, consequently many accurate observations on the biologies of our species must be accumulated before we are sure of the species limits. This paper, therefore, cannot be considered complete and is offered more to present the available information, a suggested classification and perhaps a little encouragement to subsequent workers than as a final monograph of the genus.

ACKNOWLEDGMENTS

Herbert Spencer Barber was actively interested in *Paria* for many years before his death. He sent out pleas for properly preserved series of specimens associated with carefully observed biological data. He spent a great deal of time dissecting males and mounting the genitalia on hairs (preferably from the toe of a leopard). Judging from the

specimens in the National Museum collection and the few scattered notes he left, he was able to identify specimens of the species which were available to him. Since he was an extremely careful and cautious man he would not commit to paper anything of which he was not absolutely sure. Consequently his manuscript notes consisted of short summaries of published descriptions, mere suggestions of his opinions concerning the taxonomy of the genus, and complaints about the condition of museum specimens and the lack of associated biological data. Although his manuscript was discouraging, personal communication with him was very encouraging and inspiring. I have included a few quotations from his manuscript in this paper.

I wish to express my appreciation to W. H. Anderson and George B. Vogt, of the Division of Insect Identification of the United States Department of Agriculture and the United States National Museum (USNM), for cooperation in sending Mr. Barber's manuscript notes to me and permitting me to examine the specimens with which he worked.

My sincere thanks go to the following for making available the types and other material under their care. W. J. Brown and Stanton D. Hicks, Entomology Division, Science Service, Department of Agriculture, Ottawa, Canada (CNC-Canadian National Collection); John C. Pallister, American Museum of Natural History; P. J. Darlington, Museum of Comparative Zoology (MCZ); Henry Dietrich, Cornell University (Cornell); R. R. Dreisbach, Midland, Mich. (D); C. A. Frost, Framingham, Mass. (Frost); J. N. Knull, Ohio State University (OSU); Fred A. Lawson, Kansas State College (Kans.); A. T. McClay and Leslie M. Smith, University of California at Davis (U. Cal.); D. D. Millspaugh, Iowa Wesleyan College (Iowa); J. A. G. Rehn, Philadelphia Academy of Natural Sciences; L. H. Rolston, formerly at University of Arkansas (U. Ark.); Milton Sanderson, Illinois Biological Survey at Urbana (Ill.); Joe Schuh, Klamath Falls, Oregon; John L. Ward, Houston, Texas; Howard V. Weems, State Plant Board of Florida; Donald M. Weisman and B. B. Fulton, University of North Carolina (Weisman); F. G. Werner, University of Arizona (U. Ariz.); I. C. G. Cooper, Staten Island Institute of Arts and Sciences; Ray Everley, Purdue University, Lafayette, Ind. (Purdue-Blatchley). Specimens in the New York State Museum (NYSM) and the author's collection (W) were also included in this study.

The present locations of specimens mentioned in this paper are indicated by collection names or abbreviations in parentheses following the recorded data. The abbreviations used are listed in the preceding paragraph.

TAXONOMIC HISTORY

The genus *Paria* was established by Leconte in 1858 for *Paria quadriguttata* Leconte and four previously named species, *Colaspis sexnotata* Say, *Eumolpus aterrima* Oliv., and *Cryptocephalus canella* Fab. Jacoby, in 1908, designated *P. quadriguttata* as the genotype.

The first name applied to any species we now include in *Paria* was *Cryptocephalus canellus* Fabricius 1801. The type was collected by Bosc in Carolina, probably near Charleston. Olivier, seven years later, redescribed and illustrated *canellus* and transferred it to *Eumolpus*. At the same time he described *Eumolpus aterrimus*, also collected by Bosc in Carolina. In 1824 Say described *Colaspis sexnotata* and *C. quadrinotata* and in the same year Leconte described *C. infuscata* which he later synonymized with *quadrinotata*. Melsheimer in 1847 described *Metachroma thoracica* and *M. melanura*. Leconte erected the new genus *Paria* in 1858 for his new *quadriguttata*. He transferred *quadrinotata*, *sexnotata*, *aterrima* and *canella* to *Paria*. During the following year he described *Paria opacicollis* and *P. pumila*.

Crotch, in 1873, added the names *P. gilvipes*, *laevicollis* and *nigrocyaneus*. Lefevre described *Typophorus histrio* in 1877. Horn led the way into the confusion which has existed to the present. He listed all these names except *nigrocyaneus* as color varieties or synonyms of *Typophorus canellus*. He added, at that time, the varieties *T. sellatus* and *T. vittatus*. Subsequent authors followed Horn listing most *Paria* species under the name *Typophorus* or *Paria canella*. In 1920 Notman added the variety name, *T. scutellaris*. Blatchley believed there were a number of distinct species in the genus and made a little progress in identifying them. He described *Paria juniperi* as a full species in 1927 and suggested some species might be recognized by host specificity.

LIFE CYCLE

Smith and Kido, 1949, in their careful study of biology of the strawberry rootworm, *P. fragariae* Wilcox, report the following life cycle in the Santa Clara Valley, California. The beetles usually lay their eggs close to the source of food between two adjacent surfaces. They insert several eggs into the carefully selected crevice, then secrete a shallow wall of black substance which partially encircles the egg mass. A single beetle may deposit 207 eggs in its lifetime, although 125 is an approximate average. The length of the ovipositional period for beetles caged at room temperatures varied from 55 to 137 days. The incubation period at room temperatures was found to be nearly 16 days. The majority of the larvae was found within the first 3 inches under the surface of the soil. At room temperatures, approximately 50 days were required for the larva to reach maturity. There

are 4 instars for the larval stage. The prepupal stage varied from 4.2 days at 70° F. to 6.66 days at 80°. The pupae were found close to the plant in smooth-walled cells in the soil. At room temperatures, the pupal stage required a mean of 10.53 days. The time required for development from egg to adult was approximately 82 days.

The peak of emergence of new adults took place between July 15 and August 15. The adults remained active, feeding on the leaves of their host plant, until they became inactive because of the low temperatures. Even on warm days in winter, some activity was seen in the field. The beetles passed the winter on or in the ground. In raspberry patches most of them were found in surface rubble, particularly in the tightly curled edges of dried leaves, in hollow canes or in any interstice large enough to admit their bodies. Some are found under the highest and driest clods on the crown of a hedgerow; earthworm holes in such clods are especially favored. In strawberry patches the beetles usually hibernate in the crown of the plants, often wedging themselves in between the leaf bases, and usually below the top of the soil. Strawberry plants support some green leaf tissue throughout the winter and usually new raspberry suckers emerge from the soil in early February. Consequently, food is available to the beetles at the time they emerge from hibernation early in February. The beetles were active for 29 to 43 (average 32.3) days in the spring before the first eggs were produced.

Bennett and Fulton, 1953, studied the life cycle of the strawberry rootworm in North Carolina. They were able to rear larvae on strawberry leaves in covered glass dishes. Their observations were similar to those of Smith and Kido. Oviposition in the laboratory occurred from April 17 to mid-July. The cycle was a few days shorter than for the California population; egg 7.8 days, larva 47 days and pupa 7.8 days. A few beetles of the reared first generation deposited eggs which developed into a partial second generation. The individuals developing from these eggs were found in the pupal stage in December, indicating that some beetles may overwinter as pupae. One hundred beetles collected on July 24 were dissected. Four were males and 72 of the 96 females had eggs present. A female, reared by itself, deposited viable eggs, thus demonstrating parthenogenesis.

Weigel's description of the eastern Greenhouse form (*P. fragariae*) indicates that its life history is nearly identical with that of the North Carolina population. However, he states there are at least two generations annually, and all forms may be found at any time of the year.

The life cycle of *P. quadrimotata*, as described by Read, 1939, is similar to that of *P. fragariae*. A few more days were reported for

each of the immature stages but he gives no indication of how carefully the data were gathered. This species became active during late April and May before walnut buds opened. Beetles were found active and feeding in mid-October.

HOST PLANTS

Specimens of *Paria* caught my attention some 15 years ago (1942) when I noticed rather evident preference of similar forms for certain plants. These observations led to more carefully kept records and attempts to analyze published records. It is believed that the species of *Paria* are closely restricted in regard to host plants, at least for larval development. In spite of this, host records may be misleading for two reasons. First, there may be periods in the year (spring or autumn) when dispersal flights occur. Migrations occur during which beetles may be collected far from their natural host. Secondly, adult beetles may be active at a time or place in which their normal food plant cannot be found. A species may emerge from hibernation before the buds of its host have opened enough to provide adequate food, or, clean culture, as for strawberry beds, drives any survivors from the preceding fallow condition of the area onto this plant which may not be the normal host. Although these exceptions may occur, certain *Paria* forms are found rather consistently on specific plants and these were taken as the basis for the present revision.

Paria specimens have been collected from the following plants. An asterisk, marking a specific name, indicates that the plant under which the species is listed is probably its normal host.

Pinaceae	<i>Juniperus virginiana</i> L. <i>Juniperus horizontalis</i> Moench <i>Juniperus</i> sp.	* <i>P. sexnotata</i> * <i>P. juniperi</i> <i>P. quadrinotata</i>
Salicaceae	<i>Salix</i> spp. <i>Salix nigra</i> Marsh <i>Populus</i> sp.	* <i>P. quadriguttata</i> <i>P. opacicollis</i> <i>P. quadriguttata</i>
Myricaceae	<i>Comptonia peregrina</i> L.	* <i>P. frosti</i>
Juglandaceae	<i>Juglans</i> spp. <i>Carya</i> spp. <i>Carya</i> sp.	* <i>P. quadrinotata</i> * <i>P. quadrinotata</i> <i>P. opacicollis</i>
Corylaceae	<i>Corylus americana</i> Walt. <i>Carpinus caroliniana</i> Walt.	<i>P. quadrinotata</i> ? <i>P. scutellaris</i>
Fagaceae	<i>Quercus</i> sp.	* <i>P. opacicollis</i>
Polygonaceae	<i>Rumex</i> sp.	? <i>P. scutellaris</i>
Amaranthaceae	<i>Amaranthus retroflexus</i> L.	<i>P. thoracica</i>
Platanaceae	<i>Platanus occidentalis</i> L.	<i>P. quadriguttata</i>

Rosaceae	<i>Fragaria</i> spp.	* <i>P. fragariae</i>
	<i>Fragaria</i> sp.	? <i>P. scutellaris</i>
	<i>Fragaria virginiana</i> Duch.	<i>P. thoracica</i>
	<i>Rosa</i> sp.	* <i>P. fragariae</i>
	<i>Rubus</i> spp.	* <i>P. fragariae</i>
	<i>Rubus</i> sp.	<i>P. sellatus</i>
	<i>Rubus odoratus</i> L.	<i>P. quadrinotata</i>
	<i>Pyrus malus</i> L.	? <i>P. quadrinotata</i>
	<i>Pyrus (Sorbus)</i> sp.	<i>P. quadrinotata</i>
	<i>Prunus</i> sp.	<i>P. quadrinotata</i>
	<i>Crataegus</i> sp.	<i>P. quadrinotata</i>
Leguminosae	<i>Medicago</i> sp.	<i>P. arizonensis</i>
	<i>Mimosa</i> sp.	<i>P. arizonensis</i>
	<i>Trifolium</i> sp.	<i>P. thoracica</i>
Vitaceae	<i>Vitis</i> sp.	<i>P. thoracica</i>
Guttiferae	<i>Hypericum</i> spp.	* <i>P. sellata</i>
Cornaceae	<i>Cornus</i> spp.	* <i>P. scutellaris</i>
	<i>Cornus amomum</i> Mill.	<i>P. fragariae</i>
Passifloraceae	<i>Passiflora</i> sp.	<i>P. quadrinotata</i>
Labiate	<i>Pycnanthemum</i> sp.	<i>P. sellata</i>
Verbenaceae	<i>Avicennia nitida</i> Jacq.	<i>P. virginiae</i>
Compositae	<i>Solidago</i> spp.	* <i>P. thoracica</i>
	<i>Solidago</i> sp.	<i>P. sellata</i>
	<i>Aster</i> spp.	* <i>P. thoracica</i>
	<i>Iva frutescens</i> L.	* <i>P. aterrima</i>

The following plants are listed in the literature as *Paria* hosts but I have not seen specimens and cannot state which species of *Paria* was doing the damage: wild crabapple, cinquefoil, peach, redbud, horseweed, oat, rye, millet heads and potato.

No valid host records are known for the following species of *Paria*: *P. barnesi* n. sp., *P. blatchleyi* n. sp., *P. arizonensis* n. sp., and *P. canella* (Fab.).

MORPHOLOGY AND CHARACTERS USED IN IDENTIFICATION

The genus *Paria*, in the Typophorini, Eumolpinae, may be defined as follows. Ovate, length approximately twice the width, widest at or behind middle of elytra. Elytra distinctly wider than prothorax. Color yellow, orange, brown or black. Ocular sulci not joined in front, narrow above eyes. Pronotum with lateral margins. Anterior margin of prothorax broadly lobed behind eyes. Elytra glabrous, with regular rows of punctures. Prosternum twice as long as wide at middle, narrowed at apical third, widest behind coxae, deflected and hollowed in front so as to protect the mouth when head is bent down. Front

and hind femora may have a small tooth. Middle and hind tibiae externally, broadly emarginate near apex, emargination ciliate. Tibiae without apical spurs. Tarsal claws bifid. Aedeagus with at least some indication of lateral apical lobes, which, in most species, may be strongly developed.

Paria and *Typophorus* Erichson are very closely related. The form of the ocular sulci will separate the North American species. In *Typophorus* the ocular sulci are very wide above the eyes (figure 35) and more or less join in front. The aedeagus of *Typophorus* lacks any indication of lateral apical lobes.

It is very difficult to separate males from females by external characters. However, with a little experience, males may be recognized by the denser pubescence of the last ventral abdominal segment. In females the pubescence is evenly distributed across the segment and there is little or no indication of a median subapical depression. In the males there is a median, subapical, transverse depression in which the pubescence is distinctly denser than on the rest of the segment. In groups I and II the form of this pubescent area is similar. The pubescence is extremely dense, brushlike and distinctly limited to a transverse groove situated very near the apical margin of the segment. It covers only the apical fourth or fifth of the segment. In group III the subapical depression is much shallower and broader, extending forward often to the middle of the segment. The pubescence in this area is not as dense as in groups I and II.

The apex of the aedeagus provides characteristics which may be used in defining subgeneric groups of species. In group I (figures 16, 17, 18, 21) the aedeagus lacks distinct lateral apical lobes. There is usually a lateral, apical angle but no distinct lobe extending beyond the base of the median lobe. This is a rather heterogeneous group containing *frosti* and *barnesi* which are not closely related to the other two, *quadriguttata* and *blatchleyi*. In group II the lateral apical lobes (figures 19-20, 22-25) are moderately developed, extending beyond the base of the median lobe but much shorter and smaller than the median lobe. It is a more homogeneous group but can be divided by pronotal punctuation into two subgroups, the species which feed on juniper and those which do not. In group III the lateral apical lobes (figures 26-33) are usually larger than the median lobe and are nearly as long. This is a group of closely related species which are usually broader and more convex than the others.

Certain differences between illustrations of the aedeagus may appear to be quite significant. However, anyone not familiar with the genus should be careful. Some of the differences are due to the manner in which the organ changed when the insect was killed. These illustra-

tions were drawn from dried specimens and in such there is frequently a collapse of the aedeagus making it appear flatter or less evenly curved when viewed from the side.

A great deal of the present confusion in *Paria* stems from the fact that earlier descriptions referred only to the coloration of the types. Later, because of the lack of easily defined morphological characters and extreme variation in color patterns of some species, it was suggested that there was only one species in *Paria* with numerous color varieties. Color patterns may be useful in some cases but they must be used with caution, since nearly every color pattern may be found in more than one species. I have reduced descriptions of coloration of the *Paria* species to a listing of color patterns or color forms by number. These color pattern numbers refer to figures 1 through 15 on Plate 1. Consequently "color pattern 5" or "color form 5" is exemplified by figure 5 and so on.

The form of the marginal bead of the elytra, the ridge between the disc of the elytron and epipleura, is useful in identifying some species. In most it is acute or at least distinct as a convex ridge reaching the elytral apex or, in some forms, becoming confluent with the outer margin of the epipleura. In a few species it is flattened behind the middle of the elytra becoming indistinct before it reaches the apex or joins the outer margin of the epipleura (figure 42c).

Presence or absence of a tooth on the front and posterior femora is a character which facilitates identification of some species. This tooth is on the lower anterior surface of the front femur or lower posterior surface of the hind femur, a little nearer the apex than base of the femur (figure 38a). In many species it is very small, therefore high magnification and careful observation may be necessary to detect it. Sometimes the normal pubescence is arranged so as to obscure the tooth.

The tarsal claws are deeply bifid and the inner lobe is much shorter than the outer one. The comparative lengths of the two lobes of each claw provide a character which is useful in defining some species. The length of each lobe is indicated by the parallel lines in figures 39 and 41. Length of each lobe is measured from its apex to the base of the whole claw.

A character of limited value is found in the distance between the ocular sulcus and the eye. This is measured in the area in which the sulcus is nearest to the eye (figure 42a), from the outer edge of the marginal facets to the margin of the sulcus. Occasionally these outer facets are not pigmented and must be identified by form rather than color.

The surface of the head, pronotum or elytra is said to be alutaceous when it is covered by an extremely fine network of grooves as in figure 43.

TABLE OF NORTH AMERICAN SPECIES OF
Paria LECONTE

GROUP I

1. <i>frosti</i> n. sp.	Mass., Maine
2. <i>barnesi</i> n. sp.	Fla.
3. <i>quadriguttata</i> Leconte <i>saliceti</i> Wilcox	Ohio, Alberta, Calif., Tex.
4. <i>blatchleyi</i> n. sp.	Fla., Ga.

GROUP II

5. <i>sexnotata</i> (Say)	Pa., Ind.
6. <i>juniperi</i> Blatchley	Ohio, Tenn., Mo.
7. <i>quadrinotata</i> (Say) <i>infuscata</i> (Leconte) <i>melanura</i> (Melsheimer) <i>gilvipes</i> Crotch <i>canella</i> auct., in part	Eastern U.S., Kans.
8. <i>fragariae</i> Wilcox <i>canella</i> auct., in part	Eastern U.S., Kans., Calif.
9. <i>scutellaris</i> (Notman)	N.Y. to Kans.
10. <i>virginiae</i> n. sp.	Fla.

GROUP III

11. <i>opacicollis</i> Leconte <i>laevicollis</i> Crotch <i>histrio</i> (Lefevre)	N.Y., Wis., Tex.
11a. <i>wenzeli</i> n. subsp.	N.J., N.C.
12. <i>arizonensis</i> n. sp.	Ariz., Tex.
13. <i>thoracica</i> (Melsheimer) <i>canella</i> auct., in part	Eastern U.S. to Manitoba, Okla.
14. <i>sellata</i> (Horn) <i>vittata</i> (Horn)	Eastern U.S. to Ark.
15. <i>canella</i> (Fabricius) <i>robusta</i> (Blatchley)	S.C., Fla.
16. <i>aterrima</i> (Olivier)	N.Y., Fla.

KEY TO THE SPECIES OF *PARIA* LEC.

1. Marginal bead between disc and epipleura of elytra becoming rounded and indistinct behind middle (figure 42c)..... 2
Marginal bead of elytra acute and distinct to apex, may unite with inner margin of epipleura but not becoming indistinct before joining inner margin of epipleura 5
2. Front femur with small but distinct tooth (figure 38a)..... *fragariae* Wilcox
Front femur without tooth..... 3
3. Elytra black or dark brown, rarely with faint indications of basal and postmedian darker spots (color patterns 14, 15); host plants are goldenrod (*Solidago* spp.) and aster (*Aster* sp.)..... *thoracica* (Melsh.)
Elytra in large part pale, may have suture, basal and postmedian spots black or spots may join to form longitudinal stripes or elytra may be dark with pale lateral and apical margins (color patterns 4, 10, 11) 4
4. Larger, 3.5-4.0 mm. long; usually elytra dark with pale lateral and apical margins, rarely vittate or maculate; host is St. Johnswort (*Hypericum* sp.) *sellata* (Horn)
Smaller, 2.8-3.6 mm. long; elytra with spots or stripes; known only from New Jersey *opacicollis wenzeli* n. subsp.
5. Pronotal punctuation coarse with at least some of the punctures confluent 6
Pronotal punctuation coarse to indistinct but in no case are punctures confluent 7
6. Pronotal punctures very coarse, at least some of the punctures confluent forming short longitudinal furrows; on *Juniperus horizontalis*
juniperi Blatch.
Pronotal punctures usually finer, rarely confluent, very rarely as in *juniperi*; on *Juniperus virginiana*..... *sexnotata* (Say)
7. Hind femur without tooth..... 8
Hind femur with tooth (figure 38a)..... 9
8. Aedeagus with indistinct, lateral, apical lobes (figure 18); surface of clypeus between punctures smooth, coloration extremely variable
quadriguttata Lec.
Aedeagus with moderately developed, lateral, apical lobes (figure 24); surface of clypeus alutaceous; uniform dark brown in color; Gulf States *virginiae* n. sp.
9. Front femur without tooth..... 10
Front femur with tooth..... 18
10. Pronotum with punctures of moderate size; aedeagus with small, obsolete, lateral apical lobes (figures 16-18, 24), group I..... 11
Pronotum impunctate or with very fine punctures; aedeagus with large, lateral apical lobes (figures 26-33), group III..... 14
11. Surface of clypeus between punctures alutaceous..... 12
Surface of clypeus between punctures smooth, not alutaceous; 3.3-4 mm. long; host is willow (*Salix* spp.)..... *quadriguttata* Lec.
12. Aedeagus with moderately developed lateral apical lobes (figure 24); uniform dark brown in color; Gulf States..... *virginiae* n. sp.
Aedeagus with indistinct lateral apical lobes (figures 16-17)..... 13
13. Punctures of clypeus moderate, distinct; upper surface brownish yellow, elytra with disc black or each with a longitudinal stripe; Massachusetts *frosti* n. sp.

Punctures of clypeus very fine, indistinct; uniformly brown in color;
Florida *barnesi* n. sp. 15

14. Elytra entirely black or dark brown, pronotum pale or dark. 15

Each elytron with a basal and a postmedian dark spot or a longitudinal
stripe or elytra dark with pale lateral and apical margins; pronotum
pale 16

15. Eastern, found along the coast from Long Island to Florida; pronotum
usually broader, less convex; on *Iva* *aterrima* (Oliv.)

Found in Mississippi Valley or west of it; pronotum usually narrower,
more convex; host goldenrod, aster, *Pamaranth* *thoracica* (Melsh.)

16. Size small, less than 3.5 mm. long; inner lobe of tarsal claw longer
than half the length of outer lobe. 22

Size large, 3.5 mm. or longer; inner lobe of tarsal claw about half the
length of outer lobe. 17

17. Elytra vittate or with entire discal area black, very rarely colored as
canella; Pennsylvania and North Carolina west to Missouri and
Arkansas; on St. Johnswort (*Hypericum* sp.) *sellata* (Horn)

Elytra pale with suture, a basal and a postmedian spot dark; South
Carolina and Florida *canella* (Fab.)

18. Ocular sulcus, at point nearest eye, farther from eye, distance between
sulcus and eye equal to diameter of facet or greater. 19

Ocular sulcus, at point nearest to eye, close to eye, distance between
sulcus and eye equal to one-half diameter of facet or less. 20

19. Aedeagus with distinct lateral apical lobes (figure 19); host is *Juniperus*
virginiana; color patterns 2, 4, 6 and 11. *sexnotata* (Say)

Lateral, apical lobes of aedeagus very small, faintly indicated (figure 18);
host is willow (*Salix* sp.) *quadriguttata* Lec.

20. Abdomen and metasternum entirely pale. 21

Ventral surface of abdomen and metasternum mostly black (very rarely
pale) 23

21. Pronotal punctures very small or absent; form robust, convex; aedeagus
with lateral apical lobes, large, nearly as long as median lobe and much
broader (figures 26, 28); New York to Texas. *opacicollis* *opacicollis* Lec.

Pronotal punctures moderate in size, quite distinct; form more elongate;
aedeagus with lateral apical lobes very small, indistinct (figures 18,
21) 22

22. Clypeus, between punctures, smooth, not alutaceous. *quadriguttata* Lec.

Clypeus strongly alutaceous; from Florida *blatchleyi* n. sp.

23. Aedeagus with small, indistinct lateral apical lobes (figure 18); clypeus
smooth, not alutaceous, punctures few, distant; host is willow (*Salix*
spp.) *quadriguttata* Lec.

Aedeagus with moderately developed, lateral apical lobes (figures 22,
23, 25); clypeus alutaceous, punctures close. 24

24. Larger, 3.4-4 mm. long; pronotum entirely black, even when elytra are
pale; walnut is the usual host, has been found on hazel, wild cherry
and mountain ash. *quadrinotata* (Say)

Smaller, 2.5-3.7 mm. long; pronotum pale, usually with median black
area, entirely black only when elytra are entirely black or nearly so. 25

25. Elytra usually pale with a basal and a postmedian black spot, occasion-
ally entirely black, base rarely pale in darker specimens; hosts are

strawberry, raspberry and rose.....*fragariae* Wilcox
 Elytra usually black with narrow basal and scutellar area pale, rarely
 pale with spots; found on various species of dogwood (*Cornus* spp.)
scutellaris (Notman)

DISCUSSION OF *PARIA* SPECIES

1. *Paria frosti* new species

(FIGURE 16)

Robust; reddish yellow, vertex and pronotum each usually with a small median black spot; elytra with color patterns as in figures 10 and 11; meso and metasternum and abdomen dark. Head pale, area around coronal suture dark; coronal suture impressed; frontal suture faintly impressed; ocular sulci deep, distant from eye above; vertex moderately punctate, surface alutaceous; interocular distance two-thirds width of head across eyes. Pronotum broad, length is three-fourths width, convex; surface smooth, moderately, sparsely punctate; basal marginal bead broad, alutaceous. Scutellum broad, round; surface alutaceous. Elytra short, length $2\frac{1}{2}$ times width; rows of punctures regular; punctures coarse on basal half, obsolete on apical third; marginal bead acute to apex. Prosternum pale; little narrowed between front coxae, surface alutaceous, very coarsely punctate, sparsely pubescent; anterior margin convex. Meso and metasternum black; very shiny, side pieces and coxae alutaceous; abdomen black; surface alutaceous; pubescence sparse, fine. Legs yellow; shining; posterior femora each with a very small tooth; inner tooth of posterior tarsal claw short, half length of outer lobe. Aedeagus rather narrow in apical half; gradually narrowing from base; median apical lobe broad, rounded; lateral lobes faintly indicated. Length 3-3.5 mm.; width 1.6-1.8 mm.

Types. Holotype: ♂, Sherborn, Mass., May 27, 1950, Frost (Frost). Allotype: ♀, same data (Frost). Paratypes: 1 ♂, same data (W); 1 ♀, Ashland, Mass., June 10, 1952, Frost (W); 1 ♂, 2 ♀ ♀, Natick, Mass., Oct. 4, 1946, Frost (NYSM, W, Frost); 2 ♂ ♂, Sherborn, Mass., May 25, 1950, Frost (Frost, W); 1 ♀, Framingham, Mass., May 18, 1907 (Frost); 1 ♀, Monmouth, Maine, June 21, 1906 (Frost).

Host. Mr. Frost swept the Sherborn specimens from sweet fern, *Comptonia peregrina* L.

This species is known only from a few specimens collected by C. A. Frost of Framingham, Mass., consequently it is named in his honor. It is similar in form and color to *P. sellata* (Horn) differing in size and the darker pronotum and in the form of the aedeagus. The aedeagus is slender, not broader at base, and with feebly indicated lateral apical lobes.

2. *Paria barnesi* new species

(FIGURE 17)

Form robust, moderately convex. Color brown; under side and disc of elytron may be darkened. Vertex finely punctate. Surface of clypeus alutaceous, finely punctate. Ocular sulcus close to eye, one-half width of facet. Frontal suture not impressed, coronal suture in some specimens feebly impressed. Emargination of eye with distinct depression. Surface of pronotum alutaceous, dull; pronotal punctuation fine. Surface of elytra alutaceous, punctures, except for a small area on disc very small; series not impressed. Ridge between elytron and epipleura reaching apex. Front femora without tooth, hind femora with very small tooth. Posterior tarsal claws with inner lobe moderate, little more than one-half length of outer lobe. Aedeagus with lateral apical angles distinct, obtuse. Length 3-3.5 mm., width 1.7-1.9 mm.

Types. Holotype: ♂, Jacksonville, Fla., July 27, 1942, R. C. Barnes collector (W No. 352). Allotype: ♀, Green Cove Springs, Fla., July 27, 1942, R. C. Barnes.

Host. Not known.

This species is closely related to *P. frosti* from which it differs in being a little more convex, more distinctly alutaceous on the pronotum and elytra and in having a broader aedeagus.

3. *Paria quadriguttata* Lec.

(FIGURES 6, 12, 18)

Paria quadriguttata Leconte, 1858:86

Paria saliceti Wilcox, 1954:408, new synonymy

Form elongate. Color extremely variable, may have color patterns as in figures 1, 2, 6, 10, 11, 12, 13 or 14. Vertex alutaceous, punctures close, coarse. Clypeus moderately punctate surface smooth or very faintly alutaceous in median portion. Ocular sulcus close to eye at nearest point, one-half width of facet. Frontal suture not impressed, coronal suture faintly impressed. Punctuation of pronotum variable moderately fine to coarse, surface between punctures smooth, rarely faintly alutaceous. Elytral punctures fine, close, striae not impressed. Marginal bead of elytron, between disc and epipleura, acute to apex. Front and hind femora each with a small tooth. Posterior tarsal claws with inner lobe short, one-half length of outer lobe. Aedeagus long, narrower at apex, median lobe broad, lateral apical lobes very much reduced. 3.3-4.5 mm. long, 1.8-2.2 mm. wide.

Known from Ohio to Alberta south to Texas and Arizona.

Types. The type of *P. quadriguttata* Lec. in the Leconte collection, MCZ type number 4315, from "Fort Yuma," Calif., is a female. The holotype of *P. saliceti* Wilcox is a male from Lorain County, Ohio, June 15, 1946 (W).

Other specimens examined. ARIZONA: 3 ♂♂, 1 ♀, Carrizo, May 28, 1948, D. J. and J. N. Knull (OSU). ILLINOIS: 1 ♂, Milford, June 23, 1954, Sanderson, *Salix* (Ill.); 1 ♂, 2 ♀♀, Zion, L. Michigan beach, June 6, 1950, Sanderson, on cottonwood (Ill.); 10 ♂♂, 4 ♀♀, Fox Ridge State Park, May 18, 1950, on *Salix interior* (Ill.); 3 ♀♀, Toledo, May 18, 1950, Sanderson and Stannard, on sycamore (Ill.); 1 ♂, 1 ♀, New Holland, Oct. 21, 1941, Mohr and Burke (Ill.); 1 ♀, Shawnee, July 14, 1948, Mills and Ross, on *Salix nigra* (Ill.); 2 ♀♀, Casey, April 22, 1949, Ross and Stannard, on *Salix* (Ill.). INDIANA: 1 ♂, Tippecanoe County, May 3, 1952, N. M. Downie (Frost). IOWA: 1 ♂, 2 ♀♀, Wapello County, June 5, 1931, Moore (Iowa); 1 ♂, Dickinson County, June 30, 1933 (Iowa); 2 ♂♂, 1 ♀, Henry County, March 24-July 30, Millspaugh (Iowa). KANSAS: 1 ♂, 2 ♀♀, Medora, April 13, 1932, H. M. Smith, sand dunes (Kans.); 1 ♂, 2 ♀♀, Manhattan, May 26-June 5, Fritz (Kans.). LOUISIANA: 1 ♂, Tallulah, July 7, 1930, Smith (Frost). NEW MEXICO: 1 ♂, 2 ♀♀, Jemez Springs (Frost). OHIO: 1 ♂, 1 ♀, Lorain County, June 15, 1946, Wilcox, on willow (W); 3 ♂♂, 6 ♀♀, Franklin Co., May 29-Sept. 4, 1942, Wilcox (W). OREGON: 1 ♂, 2 ♀♀, Freewater, Oct. 8, 1914, Moznette (Schuh); 1 ♀, Cayuse, May 13, 1938, Gray and Schuh (Schuh). TEXAS: 2 ♂♂, Davis Mts., June 21, 1949, D. J. and J. N. Knull (OSU); 1 ♂, 3 ♀♀, Leon Co., April 23, 1949, J. L. Ward (W); 2 ♂♂, 1 ♀, Dallas County, April 30, 1939, Maxwell (Ill.); 2 ♂♂, Austin, June 15, 1943, Frison (Ill.). UTAH: 1 ♂, 1 ♀, Provo, A. B. Call (Utah). ALBERTA: 5 ♂♂, 2 ♀♀, Lethbridge, May 7-June 5, 1930, J. H. Pepper (CNC); 1 ♀, Medicine Hat, August 24, 1930, J. H. Pepper (CNC). MANITOBA: 1 ♀, Onah, 9-16, Wallis (Frost). SASKATCHEWAN: 1 ♂, Saskatoon, August 15, 1940, A. R. Brooks, on willow (CNC); 3 ♀♀, Elbow, June 23, 1954, Brooks-Wallis (CNC).

Host. Willow (*Salix* spp.). Also recorded on sycamore and poplar.

P. quadriguttata has the greatest range of any species of *Paria*, with the possible exception of *P. fragariae*, and in most of that range it is also the most variable in coloration. The size of the pronotal punctures may vary from moderately fine to coarse and the femora may or may not have teeth. The form of the aedeagus is quite constant and differs from most other species in lacking lateral apical lobes. In comparison with the species which also lack these lobes, it is larger and more slender than *P. frosti* and *P. barnesi*, and the median apical lobe of the aedeagus is narrower than that of *P. blatchleyi*.

4. *Paria blatchleyi* new species
(FIGURE 21)

Paria canella sexnotata (Say), Blatchley, 1925:2

Form elongate. Color form 2. Punctuation of vertex moderate. Surface of clypeus alutaceous, punctuation moderate. Ocular sulcus above eye deep, less than half width of facet at closest point. Frontal suture not impressed, coronal suture impressed. Punctuation of pronotum moderate, surface between punctures alutaceous. Elytra moderately convex, surface smooth, punctures moderate, close, striae not impressed. Ridge between elytron and epipleuron reaching apex. Front and hind femora each with tooth. Posterior tarsal claws with inner lobe short, one-half length of outer lobe. Aedeagus with outer apical lobes small, inner lobe broad. 3-3.6 mm. long; 1.7-1.9 mm. wide.

Types. Holotype: ♂, Dunedin, Fla. (W. No. 435). Allotype: ♀, Dunedin, Fla., February 13, 1917, W.S.B. (W). Paratype: ♂, St. Simons Island, Ga., July 18, 1931, Frost (Frost); ♀, Dunedin, Fla., February 25, 1937, Bradley (Cornell). 1 ♂, 1 ♀, Dunedin, Fla., November 28, 1924, W.S.B. (Purdue-Blatchley); 1 ♂, Dunedin, Fla., March 6, 1924, W.S.B. (Purdue-Blatchley); 1 ♀, Dunedin, Fla., March 27, 1917, W.S.B. (Purdue-Blatchley).

Host. Not known.

Blatchley records this species as *P. sexnotata* from Florida, "throughout the State. About Dunedin it is taken frequently—Dec.-Apr., but only by sweeping and beating ferns and other foliage in a dense wet hammock." Specimens which I have seen are less coarsely punctured than typical *sexnotata* from *Juniperus virginiana*.

5. *Paria sexnotata* (Say)
(FIGURES 2, 19)

Colaspis sexnotata Say 1824:445

Form elongate. Color forms 2, 4, 6 or 11. Punctuation of vertex coarse, deep. Punctuation of clypeus coarse, sparse; surface of clypeus may be smooth or alutaceous. Ocular sulcus above the eye distant, width of facet. Frontal suture not impressed, coronal suture usually faintly impressed. Emargination of eye with distinct impression. Surface of pronotum may be smooth or alutaceous; punctuation coarse, deep; punctures usually round, rarely confluent. Surface of elytra smooth, shining; punctures moderate to large; striae may be impressed. Ridge between elytron and epipleura reaching apex. Front and hind femora with distinct tooth. Posterior tarsal claws with inner lobe short, one-half length of outer lobe. Aedeagus with lateral apical lobes small with a distinct notch between lateral and median lobes. Length 2.8-3.2 mm., width 1.5-1.7 mm.

Type. Say described this species from the common juniper around Philadelphia, Pa. The types are presumed to have been destroyed.

Other localities: KENTUCKY: 1 ♀, Quicksand, June 25, 1925 (Cornell). OHIO: 16 ♂♂, 16 ♀♀, Greene County, April 19, 1948, Wilcox (W); 4 ♂♂, 13 ♀♀, Greene County, June 23, 1947, Wilcox (W).

Host. Red cedar, *Juniperus virginiana* L.

Since they fit the original description very well I shall consider as typical the large series collected by J. N. Knull and me in Greene County, Ohio on red cedar. In form this species is more elongate than *P. quadrinotata* and *fragariae*, the aedeagus is narrowed toward the apex and the pronotal punctures are coarse, usually round and usually not confluent.

H. S. Barber, in private conversation, stated that he thought there were two or three varieties recognizable by characteristics of the genitalia.

6. *Paria juniperi* Blatchley
(FIGURE 20)

Paria juniperi Blatchley, 1927:143

Form elongate. Color fairly constant, may be color forms 2, 4 or 6. Punctuation of vertex coarse, deep. Surface of clypeus alutaceous; punctuation of clypeus coarse, close. Ocular sulcus above eye distant, width of facet. Frontal suture not impressed, coronal suture feebly impressed. Emargination of eye with depression. Punctuation of pronotum very coarse, confluent, strigose, similar to that of *Metachroma quercata* (Fab.), surface between punctures smooth, shining. Surface of elytra smooth, shining, punctures moderate, striae may or may not be impressed. Ridge between elytron and epipleura reaching apex. Front and hind femora each with distinct tooth. Posterior tarsal claws with inner lobe short, one-half the outer lobe. Aedeagus with lateral apical lobes small with a distinct notch between lateral and median lobes. Length 2.8-3.3 mm., width 1.5-1.8 mm.

Known from Tennessee, Ohio, Indiana and Missouri.

Type. A male, taken in Crawford County, Ind., September 1, 1923, is presumably lost since Ray T. Everly reports that he can find no specimens of *P. juniperi* in the Blatchley collection at Purdue University.

Other specimens examined. ARKANSAS: 1 ♀, Rogers, June 6, 1946, Sanderson (Ill.). ILLINOIS: 1 ♂, 1 ♀, Brownfield, May 9, 1951, Stannard and Sanderson, on *Juniperus* (Ill.); 1 ♀, Ozark, May 5, 1950, Sanderson and Stannard (Ill.); 3 ♂♂, 4 ♀♀, Giant City S. P., April 27-28, 1949, Sanderson and Stannard, on cedar (Ill.).

MISSOURI: 1, Jefferson City, July 13, 1948, Dowdy (Frost).
OHIO: 1 ♀, Columbus, May 20, 1947, Wilcox (W); 2 ♂ ♂, 2 ♀ ♀, Columbus, June, 1947, Wilcox, on *Juniperus horizontalis* (W); 6 ♂ ♂, 5 ♀ ♀, Columbus, Aug. 3, 1947, on *Juniperus horizontalis* (W).
TENNESSEE: 1, Elmwood (Fall-MCZ).

Host. *Juniperus horizontalis* Moench.

P. juniperi is very closely related to *sexnotata* and may eventually prove to be merely a form of that species. The coarse, striate pronotal punctuation (similar to that of *Metachroma quercata* Fab.) is very rarely seen in *sexnotata*. There was very little variation in the color or pronotal punctuation in the rather large series of *juniperi* which has been taken from a creeping juniper in Columbus, Ohio.

7. *Paria quadrinotata* (Say)

(FIGURES 8, 9, 22, 38, 41)

Colaspis quadrinotata Say, 1824:446

Metachroma melanura Melsheimer, 1847:168

Paria gilvipes Crotch, 1873:39

Colaspis infuscata Leconte, 1824:173

Form moderately elongate. Color extremely variable, may be color forms 8, 9, 13 or 15. Punctuation of vertex fine to moderate. Surface of clypeus alutaceous, punctuation moderate, close. Ocular sulcus above eye close, one-half width of facet. Frontal suture not impressed, coronal suture faintly impressed. Emargination of eye with or without depression. Punctuation of pronotum fine to moderate, surface between punctures smooth, shining. Elytra moderately convex, surface smooth, shining, punctures moderate, striae may or may not be impressed. Ridge between elytron and epipleura reaching apex. Front and hind femora each with tooth. Posterior tarsal claws with inner lobe long, three-quarters length of outer lobe. Aedeagus with lateral apical lobes moderate, a distinct notch between lateral and median lobe. Median lobe narrow. Length 3.4-4 mm., width 1.8-2 mm.

Range. Eastern United States.

Types. The type of *Colaspis quadrinotata* Say, described as inhabiting "The United States," is presumed to have been destroyed. I am taking as the holotype of *Metachroma melanura* the specimen in the Melsheimer collection labeled M.C.Z. type number 29061. Melsheimer records *melanura* from Pennsylvania. The type of *Paria gilvipes* Crotch is the specimen in the Leconte collection labeled "*M. gilvipes*," M.C.Z. type number 28448. It bears an orange disc indicating the specimen came from the "southern states." The type of *Colaspis infuscata* Leconte, from Georgia, is apparently lost. Leconte's illustration and the size indicate it is the same as typical *quadrinotata*.

Other localities. ILLINOIS: 1 ♂, 12 ♀♀, Elizabethtown, May 3, 1950, Sanderson and Stannard, on *Carya* sp. (Ill.); 1 ♂, 3 ♀♀, Giant City, May 3, 1946, Burks and Sanderson (Ill.); 1 ♂, 1 ♀, Allendale, July 22, 1952, Sanderson and Evers, swept ? from *Passiflora* (Ill.); 1 ♀, LaRue, April 19, 1944, Ross and Sanderson, on *Crataegus* (Ill.). IOWA: 4 ♀♀, Henry County, May 9, 1935, Carlson (Iowa). KANSAS: 2 ♀♀, Riley County, June 5, Popenoe (Kans.). NEW YORK: 4 ♂♂, 4 ♀♀, Altamont, June 1, 1938, Chamberlain (NYSM); Wilton, August, 1922, (NYSM); Newport, May 22, 1902, elev. 1200 (NYSM); 8 ♂♂, 23 ♀♀, Newport, May 23, 1902, D. B. Young, butternut (W, NYSM); 16 ♂♂, 23 ♀♀, Albany, May 6, 1903, a774, on mountain ash (W, NYSM). NORTH CAROLINA: 1 ♂, Black Mountains, July 3 (W); 10 ♀♀, Raleigh, April 30, 1952, Weisman (Weisman). OHIO: 1 ♂, Hocking County, Aug. 8, 1946, Wilcox (W); 1 ♀, Hocking County, May 20, D. J. and J. N. Knull (W); 3 ♀♀, Delaware County, May 15, 1951, Weems (W); 1 ♀, Delaware County, June 21, Knull (W); 1 ♂, 1 ♀, Greene County, May 12, Knull (W); Greene County, July 17, 1947, Wilcox, on *Juglans* (W). PENNSYLVANIA: 3 ♂♂, 15 ♀♀, Claysville, December 17, 1948, Ross, Burks, Stannard, Acc. 49531, ground cover Berlese sample (Ill.). ONTARIO: 8 ♂♂, 5 ♀♀, Britannia, May 29, 1948, Hicks; on *Rubus odoratus* (CNC). QUEBEC: 18 ♂♂, 11 ♀♀, Old Chelsea, May 7, 1936, Brown (CNC).

Host. Walnut (*Juglans* spp.) and hickory (*Carya*). In absence of host this species may feed on hazel, *Corylus americana* Walt.; wild cherry, *Prunus* sp., and mountain ash, *Pyrus* (*Sorbus*) spp. Also recorded on *Crataegus*, *Passiflora*, *Rubus odoratus*, juniper and apple.

Paria quadrinotata is similar in appearance to *P. fragariae*. It is usually larger, less robust, with finer pronotal punctuation and with the pronotum usually entirely black.

This species is one of the commonest in collections and in the literature the name has been used almost as frequently as *canella*. However, it is very poorly known and field observations would be very fruitful.

Apparently walnut is the preferred host of *quadrinotata*. However, since walnut is one of the last trees to produce leaves in the spring the early beetles sometimes swarm on other nearby plants. Such an occurrence was observed near Albany when large numbers of beetles were observed mating and feeding on leaves of hazel and wild cherry

on May 18, 1954. The population was centered around a large black walnut tree but beetles were found only on the cherry and hazel bushes beneath the branches of the tree. The buds of the walnut were just beginning to open at that time. I was rather surprised to find no beetles nor any evidence of feeding on a hawthorn (*Crataegus*) which was also under the walnut. A few weeks later the beetles had completely forsaken the cherry and hazel and had gone onto the walnut. Felt's description of *Paria* on mountain ash is also an early spring record and probably deals with a similar situation.

The specimens swept from *Passiflora*, Allendale, Ill., are very pale. The male has elytra pale except for small marginal area and female with elytral spots very faintly indicated.

The LaRue, Ill., specimen, on *Crataegus*, is small with the pronotum more coarsely punctate than usual but otherwise it is typical of *quadrinotata*.

For lack of conclusive evidence I shall identify, tentatively, as *P. quadrinotata*, a series of four females from Ozark, Ill., September 25, 1948, Ross and Stannard, on *Pyrus malus* (Ill.). Apple has been recorded as a *Paria* host by several economic workers and these may be representative of the apple pest. Three of these specimens are pale, colored faintly as in figures 6 or 3, the other as in figure 13. The pronotal punctuation is very fine, thus separating them from *P. fragariae* and *P. scutellaris*.

A smaller, paler form, which may deserve a name, has been observed from the southeastern part of the United States. These specimens vary from 3.2 to 3.7 mm. in length and 1.7 to 2.0 mm. in width. A few females are as dark as typical *quadrinotata* (color pattern 8) but most are paler, varying to some which have the elytra pale except for two small marginal black spots. They differ from *fragariae* in being more elongate. The following specimens have been examined. FLORIDA: 2 ♂♂, Highlands Hammock, May 5, 1953, N. J. and E. L. Sleeper (W, No. 462); 1 ♀, Ocala N.F., May 6, 1953, N. J. and E. L. Sleeper (W). GEORGIA: 1 ♀, Clinch County, May 6, 1953, N. J. and E. L. Sleeper (W). NORTH CAROLINA: 6 ♀♀, Wilson County, December 11, 1954, D. M. Weisman, bark crevices (Weisman); 2 ♀♀, Havelock, April 12, 1955, D. M. Weisman (Weisman).

8. *Paria fragariae* Wilcox (FIGURES 7, 23)

Paria fragariae Wilcox, 1954:409

Form moderately robust. May be colored as in figures 1, 3, 7 or 15. Vertex strongly alutaceous, punctures close, large, shallow. Clypeus

moderately to finely punctate, surface alutaceous. Ocular sulcus close to eye. Frontal suture rarely impressed, coronal suture usually faintly impressed. Punctuation of pronotum moderate to fine, surface alutaceous. Elytral punctures moderate, striae sometimes impressed. Marginal bead of elytra may be acute and distinct to apex or rounded and obsolete behind middle. Front and hind femora each with a tooth. Posterior tarsal claws with inner lobe short, one-half length of outer lobe. Aedeagus long, narrowed at apex; median lobe long; lateral apical lobes reduced. 2.5-3.5 mm. long, 1.4-2 mm. wide.

Known from eastern United States to Kansas and also from central California.

Types. The male holotype and female allotype were taken on strawberry plants in Lorain County, Ohio, June 29, 1951 (W).

Other localities. CALIFORNIA: 8 ♀ ♀, San Jose, November 4, 1939, L. M. Smith (U. Cal.); 4 ♀ ♀, San Jose, July 5, 1940, on raspberry, (U. Cal.); 6 ♀ ♀, Santa Clara, August 10, 1936, A. T. McClay (U. Cal.); 10 ♀ ♀, E. Sonora Pass, July 18, 1940, 7,000 ft. (U. Cal.); 18 ♀ ♀, Sunnyvale, February 10, 1928, L. M. Smith (U. Cal.). FLORIDA: 4 ♀ ♀, Auburndale, October 3, 1921, Marsh, on strawberry (St. Plant Bd., Florida). ILLINOIS: 18 ♀ ♀, Pulaski County, May 1, 1942, Chandler, from strawberry (Ill.); 2 ♀ ♀, Urbana, August 20, 1929, on strawberry (Ill.); 3 ♀ ♀, Normal, September 29, 1883 (Ill.); 5 ♀ ♀, Cobden, May, 1883 (Ill.); 3 ♂ ♂, 3 ♀ ♀, Pere Marquette State Park, August 12, 1948, Sanderson and Stannard (Ill.); 1 ♀, Anna, July 13, 1884, on raspberry (Ill.). KANSAS: 9 ♀ ♀, Riley County, May 28-July 15, Popenoe (Kans.). MASSACHUSETTS: 1 ♂, 19 ♀ ♀, Ashland, June 10, 1952, Frost (F, W.). NEW YORK: 13 ♀ ♀, Dolgeville, May 22, 1951, Wilcox, on blackberry (NYSM); 5 ♂ ♂, 79 ♀ ♀, Big Flats, May 19, 1953, Wilcox, on *Cornus amomum* Mill. (NYSM). NORTH CAROLINA: 2 ♀ ♀, Raleigh, May 9, 1951, Weisman (Weisman); 2 ♂ ♂, 13 ♀ ♀, Wallace, August 13 and November 23, 1951, Bennett (Weisman); 2 ♀ ♀, Willard, May 7, 1941, Fulton, on strawberry (Weisman). OHIO: 1 ♂, 2 ♀ ♀, Lorain County, March 22, 1942 (W.). PENNSYLVANIA: 4 ♀ ♀, Gibsonia, October 25, 1935, C. F. Kocher, greenhouse pest (USNM).

It was with some, perhaps not enough, hesitation that I described the strawberry rootworm as a new species. Although it seems a shame to throw out the name under which a great deal of economic literature has been listed during the past 60 years, no alternative appeared. The name *Cryptocephalus canellus* Fabricius 1801 must almost certainly be applied to the large convex species occurring in the south-

eastern part of the United States. The location of the type of *canella*, if it exists, is not known. Fabricius' original description and Olivier's illustration fit the southeastern species far better than they do the strawberry rootworm. Types for nearly all other names have been examined and none of them seem to be conspecific with the strawberry pest. Consequently the name, *P. fragariae*, was provided for the latter.

P. fragariae is much smaller than *canella*, less convex and never strongly alutaceous. The lateral apical lobes of the aedeagus are smaller and shorter than the median lobe while in *canella* the lateral lobes are as long as and broader than the median one. *P. quadrinotata* is similar to *fragariae* but usually larger, less robust, and with black pronotum. *P. virginiae* differs from *fragariae* in its darker, duller coloration and in lacking femoral teeth. *P. scutellaris* is nearly identical in form differing in its typical coloration.

P. fragariae apparently occurs naturally over most of eastern United States from the Atlantic Coast to the plains states, from Canada to the Gulf States. I suspect the population found in central California was introduced from the east by man. The first specimens found there were collected in 1905. Essig, 1931, gives a history of the depredations of this insect in California. The populations in California and in greenhouses in the east are remarkable in that no males have ever been found. Males do occur outside of greenhouses in the east although they are rare.

9. *Paria scutellaris* (Notman)

(FIGURES 3, 13, 25, 34, 37)

Typophorus canellus scutellaris Notman, 1920:194

Form moderately robust. May be colored as in figures 6, 12 (with intergrades between these two), 13 and rarely 15. Vertex alutaceous, punctures large, shallow, close. Clypeus moderately to coarsely punctate, surface smooth or alutaceous. Ocular sulcus close to eye at nearest point, one-half width of facet from eye. Frontal suture not impressed, coronal suture faintly impressed. Punctuation of pronotum moderate to fine, usually close, surface smooth, occasionally faintly alutaceous. Elytral punctures moderate in size, striae not impressed. Marginal bead of elytra, acute and distinct to apex. Front and hind femora each with a tooth. Posterior tarsal claws with inner lobe short, one-half length of outer lobe. Aedeagus long, narrowed at apex; median lobe broad; lateral apical lobes reduced. 3-3.8 mm. long, 1.5-2.1 mm. wide.

Known from Ontario, North Carolina to Kansas.

Type. The type from Windsor, Broome County, N. Y., May 27, 1918, is in the Notman collection in the Staten Island Museum.

Other specimens examined. ILLINOIS: 1 ♀, Alton, June 27, 1934, DeLong and Ross (Ill.); 5 ♀ ♀, Beach, May 10, 1935, Frison and Ross (Ill.); 5 ♀ ♀, Zion, November 26, 1946, Ross and Burks, sandy marsh (Ill., NYSM); 1 ♀, Fox Lake, June 26, 1936, Frison and DeLong (Ill.); 5 ♀ ♀, Cora, May 3, 1946, Burks and Sanderson (Ill.). KANSAS: 3 ♂ ♂, 22 ♀ ♀, Wathena, August 8, 1941, Lamerson, on strawberry (Kans., W); 1 ♀, Lawrence, April 1930, W. L. Brown (CNC). OHIO: 2 ♂ ♂, LaGrange, March 22, 1942, Wilcox (W No. 464). OKLAHOMA: 2 ♀ ♀, Muskogee, June 6-19, 1943, Wilcox (W). NEW YORK: 1 ♂, 2 ♀ ♀, Pike, September 4, 1901 (Kans.); 4 ♂ ♂, Ithaca, June 14, 1917 (Cornell); 3 ♂ ♂, 36 ♀ ♀, Big Flats, May 19, 1953, Wilcox, on *Cornus amomum* (NYSM); 2 ♀ ♀, 2 pupae, 1 small larva, Big Flats, October 8, 1952, W. M. Clements, in ground under silky dogwood (NYSM); 2 ♀ ♀, Albany, May 15, 1951, Wilcox, *Cornus stolonifera* (NYSM); 1 ♀, Albany, May 31, 1951, Wilcox, *Cornus racemosa* (NYSM). NORTH CAROLINA: 1 ♂, Raleigh, May 18, 1951, Bennett (Weisman); 8 ♂ ♂, 4 ♀ ♀, Raleigh, April 1, 1951, Weisman, on *Rumex* sp. (Weisman, W). ONTARIO: 1 ♀, Ojibway, June 1, 1943, Hicks (CNC).

Hosts. Silky cornel or red willow, *Cornus amomum* Mill.; red osier, *Cornus stolonifera* Michx.; paniced dogwood, *Cornus racemosa* Lam.

P. scutellaris is very closely related to *quadrinotata* and *fragariae*. Some specimens of *quadrinotata* may also be colored as in figure 13, but usually they are larger, with the pronotum comparatively narrower and with much finer pronotal punctation. Difficulty is more often encountered in trying to separate *scutellaris* from *fragariae*, and it is possible that further investigations may prove the two to belong to a single species. In fact a large series which I am calling *fragariae* was found mixed with the *scutellaris* on *Cornus amomum* in Big Flats.

A series of 48 ♀ ♀, from Herod, Ill., May 3-4, 1950, collected by Sanderson and Stannard on blue beech, *Carpinus caroliniana* Walt., appear to be identical with the New York form from *Cornus*.

The series from *Cornus* and *Carpinus* listed above are not quite typical of *scutellaris*, although the other listed specimens are. Possibly the dogwood form is not true *scutellaris* but more field studies of the latter will have to be made to settle this question. In general, typical *scutellaris* is a little more convex and robust than the dogwood form,

and the pronotum is comparatively broader at the base. Some specimens with color pattern number 12 look superficially like *P. quadriguttata* but the more robust form and broader pronotum should identify them rather easily. I have seen specimens colored as in figures 6, 12, 13, 14, 15 and a vittate form like 11 with a pale suture.

10. *Paria virginiae*, n. sp.

(FIGURES 24, 39)

Form moderately elongate, convex. Color entirely dark brown. Punctuation of vertex moderate. Surface of clypeus strongly alutaceous, punctuation moderate, close. Ocular sulcus above eye close, one-half width of facet. Frontal suture not impressed, coronal suture may or may not be impressed. Emargination of eye without depression. Punctuation of pronotum fine to moderate, surface between punctures may be smooth or alutaceous. Surface of elytra strongly alutaceous, punctures moderate, distant; striae not impressed. Ridge between elytron and epipleura reaching apex. Front femur without tooth; hind femora with or without tooth. Posterior tarsal claws with inner lobes short, about one-half length of outer lobe. Aedeagus with lateral apical lobes moderate, a distinct notch between lateral and median lobes. Length 2.6-2.8 mm., width 1.5-1.6 mm.

Types. Holotype: ♂, Dade County, Fla., June 11, 1947 (W No. 436). Allotype: ♀, same data. Paratypes: 5 ♂ ♂, 5 ♀ ♀, same data.

Other localities. FLORIDA: 9 ♂ ♂, 5 ♀ ♀, Dade County, June 6, 1947, Wilcox (W); 5 ♀ ♀, Cape Sable, June 17, 1937 (U. Cal.); 1 ♀, Miami, August 3, 1933 (U. Cal.); 9 ♂ ♂, 9 ♀ ♀, Everglades Natl. Pk., Dade County, March 12, 1955, H. A. Denmark, at *Avicennia nitida* (St. Plant Bd., Florida).

Host. *Avicennia nitida* Jacq., Verbenaceae.

The very large series of this species which I collected in Dade County is very uniform and distinctive in its dark brown coloration. It is close to *fragariae* and *scutellaris* in form, but these two have a small tooth on the front femora while *virginiae* does not.

11. *Paria opacicollis* Lec.

(FIGURE 28)

Paria opacicollis Leconte, 1859:23

Paria laevicollis Crotch, 1873:40

Paria histrio Lefevre, 1877:319

Form moderately robust, moderately convex. Color constant, color form No. 6. Punctuation of vertex fine. Surface of clypeus may be smooth or alutaceous, punctuation fine, sparse. Ocular sulcus above eye close, one-half width of facet. Frontal suture not impressed, coronal suture may or may not be impressed. Emargination of eye with depres-

sion. Punctuation of pronotum fine or absent, surface between punctures may be smooth or alutaceous. Surface of elytra smooth, shining; punctures small, close; striae may or may not be impressed. Ridge between elytron and epipleura reaching apex. Front femur may or may not have tooth, hind femur with tooth. Posterior tarsal claws with inner lobe long, three-quarters length of outer lobe. Aedeagus with outer apical lobes large, as long as median lobe; median lobe narrow. Length 3.1-3.5 mm., width 1.6-1.8 mm.

Range. New York to Texas.

Types. The type of *Paria opacicollis* Leconte, from Fort Laramie, Kans., is in the Leconte collection, M.C.Z., type number 4316. The type of *Paria laevicollis* Crotch, from Pennsylvania, is in the Leconte collection, M.C.Z. type number 5065. The location of the type specimen of *Typophorus histrio* Lefevre, from North America, is unknown.

Other localities. ARKANSAS: 2 ♀ ♀, Lee County, June 28, 1924, Isely (U. Ark.); 1 ♀, Lincoln County, July 24, Isely (U. Ark.). ILLINOIS: 6 ♂ ♂, 16 ♀ ♀, Pulaski, July 15, 1948, Sanderson and Stannard (Ill.); 1 ♂, La Rue, August 7, 1946, Mohr and Sanderson (Ill.); 1 ♂, Ullin, August 7, 1946, Mohr and Sanderson (Ill.); 1 ♂, Shawneetown, July 14, 1948, Mills and Ross, on *Salix nigra* (Ill.); 1 ♀, Grand Tower, October 7, 1947, Ross, on *Quercus stellata* (Ill.); 1 ♂, Fairfield, July 14, 1948, on *Quercus imbricaria* (Ill.); 3 ♂ ♂, 1 ♀, La Grange, August 23, 1935, De Long and Ross (Ill.). IOWA: 1 ♂, Washington County, July 13, 1940, W. Jaques (Iowa). NEW YORK: 1 ♂, 1 ♀, Karner, July 21, 1951, Wilcox, on *Quercus ilicifolia* Wang (NYSM, W No. 311); 3 ♂ ♂, Karner, August 17, 1950, Wilcox, on *Quercus ilicifolia* Wang (NYSM). NORTH CAROLINA: 1 ♂, 1 ♀, White Lake, July 3, 1952, Weisman (Weisman); 2 ♂ ♂, 3 ♀ ♀, Raleigh, June 25, 1952, Weisman (Weisman). OHIO: 1 ♂, 4 ♀ ♀, Franklin County, June 28, 1942, Wilcox, on *Carya* (W). TEXAS: 1 ♂, Tatum, June 8, 1949, D. J. and J. N. Knull (OSU); 1 ♂, 2 ♀ ♀, Houston, May 8, 1950, J. L. Ward (W); 1 ♂, Karnack, May 22, 1951, D. J. and J. N. Knull (OSU); 1 ♂, Harrison County, May 18, 1948, D. J. and J. N. Knull (OSU).

Host. Oak. Also reported on hickory.

This small species is rather uniform in appearance. The pale yellow brown color, rounded elytral spots and nearly impunctate pronotum identify it rather easily. *P. canella* and rarely *sellata* are similar in color but they are much larger.

A population of *P. opacicollis* was found in the pinebush area near Karner, Albany County, N. Y. These were swept from *Quercus ilicifolia*. Because of the unusual color pattern of some of the speci-

mens they were thought at first to belong to a distinct geographical subspecies. Further study and comparison with other collections indicated that this probably is not so. However, compared with most other series, the specimens of this population are a little more convex, the aedeagus is somewhat narrower at apex and the apical lobes are smaller (figure 26). In some individuals the basal elytral spots are confluent (figure 5). I have seen an Illinois specimen with confluent spots, also.

**11a. *Paria opacicollis wenzeli* new subspecies
(FIGURE 29)**

This subspecies differs from *P. opacicollis opacicollis* in lacking a distinct marginal bead on the posterior third of the elytra and in the occurrence of many vittate specimens. Otherwise the two subspecies are very similar in appearance. *P. sellata* also is similar to *wenzeli* but is usually much larger and is only rarely vittate or maculate. 2.8-3.6 mm. long.

Types. Holotype: ♂, Da Costa, N. J., June 15 (OSU, No. 466). Allotype: ♀, Da Costa, N. J., June 15 (OSU). Paratypes: 2 ♂♂, Da Costa, N. J., June 15, (OSU); 2 ♂♂, 2 ♀♀, Atco, N. J., May 18 (OSU); 3 ♂♂, Clementon, N. J., August 10 (OSU, No. 463); C. May C. H., May 26 (OSU).

Other specimens examined. NORTH CAROLINA: 1 ♀, N. C. (OSU).

**12. *Paria arizonensis* n. sp.
(FIGURE 27)**

Form moderately elongate, convex. Color form No. 6. Punctuation of vertex fine to moderate. Surface of clypeus smooth, shining, punctuation fine, close. Ocular sulcus above eye close, one-half width of facet. Frontal suture not impressed, coronal suture impressed. Emargination of eye with depression. Punctuation of pronotum coarse, close, surface between punctures smooth, shining. Surface of elytra smooth, shining, punctures moderate, close; striae impressed. Ridge between elytron and epipleura reaching apex. Front and hind femora each with tooth. Posterior tarsal claws with inner lobe moderate or long, more than one-half length of outer lobe. Aedeagus with lateral apical lobes large, as long as median lobe; median lobe narrow. Length 3.3-3.7 mm., width 1.8-2 mm.

Types. Holotype: ♂, Chiricahua Mts., Arizona, June 27, 1949, D. J. and J. N. Knull (OSU). Allotype: ♀, same data, (OSU).

Other specimens examined. ARIZONA: 1 ♂, Amado, July 5, 1956, G. D. Butler, swept/alfalfa (U. Ariz.); 1 ♂, Sycamore Cr.

near Ruby, Santa Cruz County, Aug. 10, 1955, Werner and Butler, *Mimosa* (U. Ariz.); 1 ♂, Brown's Cn., Baboq. Mts., 3,800 ft., July 28, 1949, Werner and Nutting, sycamore-oak-mes. (U. Ariz.); 1 ♀, Nogales, April 19, 1956, Butler, swept/alfalfa (U. Ariz.); 1 ♂, Tucson, May 22, 1932, R. A. Flock (U. Ariz.); 1 ♀, Santa Rita Mts., July 16, 1932, R. A. Flock (U. Ariz.); 1 ♀, Santa Rita Mts., June 24, 1934 (U. Ariz.); 1 ♂, Rincon Mts., alt. 3,500, June 9, 1928, A. A. Nickol (U. Ariz.); 1 ♀, Ranisey Cn., Huachuca Mts., Aug. 11, 1955, Butler and Noon (U. Ariz.); 1 ♀, Catalina Mts., Htchk. Hwy. mi. 22, July 18, 1955, Werner and Butler (U. Ariz.); 1 ♀, w. sl. Patagonia Mts., Santa Cruz County, Aug. 9, 1955, Werner and Butler (U. Ariz.); 2 ♂♂, 1 ♀, Huachuca Mts., Aug. 18, 1936, D. J. and J. N. Knull (OSU); 1 ♂, Tumacacori Mts., July 22, 1940, D. J. and J. N. Knull (OSU); 1 ♂, Mt. Lemmon, Aug. 2, 1950, D. J. and J. N. Knull (OSU); 1 ♂, 3 ♀♀, Chiricahua M., July 5, 1949, D. J. and J. N. Knull (OSU); 1 ♀, Tucson, Aug. 16, 1940, D. J. and J. N. Knull (OSU); 5 ♂♂, 1 ♀, Chiricahua M., June 27, 1949, D. J. and J. N. Knull (OSU, NYSM). TEXAS: 1 ♂, 3 ♀♀, Davis M., June 2, 1937, D. J. and J. N. Knull (OSU).

Host. Not known although Werner and Butler labeled specimens from alfalfa and *Mimosa*.

Mr. Barber recognized this as a distinct species. In general appearance it is similar to *P. opacicollis*, *quadriguttata* and *sexnotata*. The coarser pronotal punctuation will separate it from *opacicollis* and the broader form and strongly lobed aedeagus separate it from *quadriguttata* and *sexnotata*. Apparently it is quite common in the mountains of eastern Arizona.

13. *Paria thoracica* (Mels.) (FIGURES 14, 30)

Metachroma thoracica Melsheimer, 1847:168

Form robust, convex. Color dark, may be color forms 1, 10, 14 or 15. Punctuation of vertex moderate. Surface of clypeus strongly alutaceous, punctuation of clypeus fine, moderately close. Ocular sulcus above eye close, one-half width of facet. Frontal suture not impressed, coronal suture impressed. Emargination of eye without depression. Punctuation of pronotum very fine or absent, surface between punctures strongly alutaceous, dull. Elytra convex, often tumid behind middle, surface may be smooth or alutaceous, punctures small to moderate, close; striae may or may not be impressed. Ridge between elytron and epipleura usually reaching apex but in many specimens

becoming rounded and indistinct behind middle of elytron. Front femora without tooth, hind femora with tooth. Posterior tarsal claws with inner lobe long, three-quarters length of outer lobe. Aedeagus with lateral apical lobes large, nearly as long as median lobe; median lobe moderately broad. Length, 3-3.6 mm., width 1.6-1.9 mm.

Common throughout eastern United States and Canada.

Type. I am taking as the holotype of *Paria thoracica* the male specimen in the Melsheimer collection labeled "Thoracica" "M.C.Z. type number 29060." Melsheimer described this species from Pennsylvania.

Other localities. ARIZONA: 1 ♀, Baboquivaria Mts., E. G. Smyth (Kans.). ILLINOIS: 13 ♂♂, 29 ♀♀, Savanna, July 15, 1955, Sanderson, host: *Aster* possibly *simplex* (Ill.); 4 ♂♂, 2 ♀♀, Urbana, July 2, 1951, Tuttle, on *Fragaria virginiana* (Ill.); 1 ♂, Urbana, July 2, 1951, Tuttle, on *Vitis* (Ill.); 33 ♂♂, 17 ♀♀, Bureau, July 25, 1947, Burke and Sanderson, host 122 (Ill.); 1 ♂, 4 ♀♀, Champaign, June 22, 1888 (Ill.). IOWA: 2 ♂♂, Henry County, June 15, 1939, Staebler (Iowa); 1 ♂, 3 ♀♀, Dickinson County, June 28, 1934 (Iowa). KANSAS: 3 ♀♀, Manhattan, June 25, 1949, Stegmaier, fr. *Amaranthus retroflexus* L. (Kans.); 2 ♂♂, 5 ♀♀, Topeka, Popenoe (Kans.); 1 ♂, 1 ♀, Riley Co., June 18, Popenoe (Kans.). LOUISIANA: 1 ♀, Tallulah, August 7, 1930, F. D. Smith (Frost). MASSACHUSETTS: 3 ♂♂, 3 ♀♀, Ashland, June 29, 1950, Frost (W); 2 ♂♂, Berkshire County, September 8, 1947, Reichert (W); 1 ♂, Natick, July 6, 1912, Frost (Frost). NEW YORK: 16, Albany, June 13, 1903, clover (NYSM); 5, Albany, July 12-25, 1927, on roof of Education Building (NYSM); 12, Poughkeepsie, June 29, 1903 (NYSM); 14, Pike (NYSM); 3, Chautauqua County, June 30, 1922 (NYSM); Speculator, Aug. 1908 (NYSM); 4, Rochester (NYSM); 1 ♂, Karner, Albany County, July 10, 1951, Wilcox (W). OHIO: 1 ♂, Columbus, June 11, 1948, Wilcox (W); 1 ♂, Franklin County, June 1949, Wilcox, on *Solidago* (W); 1 ♂, 4 ♀♀, Defiance County, June 13, 1948, Triplehorn (W); 1 ♀, Hocking County, August 21, 1946, Wilcox (W); 3 ♀♀, Lorain County, July-September, Wilcox (W). OKLAHOMA: 2 ♂♂, 2 ♀♀, Muskogee County, June 6-19, 1943, Wilcox (W). PENNSYLVANIA: 9, President, July 4, 1922 (NYSM). MANITOBA: 1 ♂, 4 ♀♀, Glenboro, April 14, 1930, N. Criddle (CNC); 2 ♂♂, 2 ♀♀, Westbourne, August 27, 1953, Brooks-Wallis (CNC); 1 ♀, Virden, July 13, 1953, Brooks-Kelton (CNC); 1 ♂, 1 ♀, Winnipeg, June 27,

1896 (CNC); 1 ♀, Goodlands, July 29, 1930, R. M. White (CNC). ONTARIO: 1 ♂, 1 ♀, Fisher Glen, June 16, 1931, W. J. Brown (CNC).

Hosts. Goldenrod (*Solidago* spp.) and aster (*Aster* spp.). Also reported on clover (*Trifolium* sp.), strawberry (*Fragaria virginiana*) and *Amaranthus retroflexus* L.

This is the common eastern species found so frequently on goldenrod and aster. It is a medium sized species, very convex with elytra tumid, usually with pronotum strongly alutaceous and usually quite darkly colored. Most often it is entirely black or black with yellow prothorax. The aedeagus has lateral apical lobes as large or larger than the median one. Occasionally the dark pigmentation is less intense and the insect is dark brown or even pale yellow instead of black. Melsheimer's "type" is such a specimen but I think it is the same species as the common, black, goldenrod form.

There is a large series of *thoracica* in the New York State Museum bearing the label "on clover." I suspect, however, that clover is a more or less incidental host which the beetles attacked after their population built up on goldenrod or aster.

14. *Paria sellata* (Horn) (FIGURES 10, 11, 31, 36, 42)

Typophorus canellus sellatus Horn, 1892:208

Typophorus canellus vittatus Horn, 1892:208

Form robust, convex. Color forms 4, 10 or 11; head and legs pale; tarsi and ventral surface darker brown. Punctuation of vertex fine. Surface of clypeus alutaceous, punctuation fine. Ocular sulcus above eye close to eye, one-half width of facet. Frontal suture not impressed. Coronal suture may or may not be impressed. Emargination of eye without depression. Punctuation of pronotum fine or absent; surface alutaceous. Punctures of elytra moderate, shallow; striae not impressed; surface between punctures smooth, shining. Ridge between elytron and epipleura becoming flattened and indistinct behind middle. Front femur with tooth, hind femur lacking tooth. Posterior tarsal claws with inner lobe moderate, a little longer than half length of outer lobe. Aedeagus with lateral apical lobes large, nearly as long as median lobe; median lobe moderately broad. Length 3.5-4 mm., width 2.0-2.2 mm.

Known from the eastern half of the United States.

Types. The type specimens in the Horn collection at the Philadelphia Academy of Natural Sciences (*sellata* is type No. 3778 and *vittata* is type No. 3779) are labeled "Penn."

Other localities. ARKANSAS: 5 ♂♂, 6 ♀♀, Fayetteville, May 24, 1924, D. Isely (U. Ark., W); 1 ♂, 5 ♀♀, Fayetteville, May 13, 1923, D. Isely, on *Rubus* (U. Ark., W.). GEORGIA: 1 ♀, Twiggs County, June 14, 1947, Wilcox (W). ILLINOIS: 1 ♂, 1 ♀, Roslyn, July 7, 1950, Ross and Sanderson, *Hypericum prolificum* L. (Ill.); 2 ♂♂, 3 ♀♀, Urbana, July 2, 1951, Tuttle, on *Hypericum sphaerocarpum* Michx. (Ill.); 2 ♂♂, 3 ♀♀, Oquawk, July 24, 1953, Sanderson, *Hypericum* (Ill.); 1 ♀, Cambria, Crab Orchard Lake, June 3, 1953, Sanderson, host *Pycnanthemum* (Ill.); 3 ♂♂, 6 ♀♀, Dwight, June 14, 1945, Ross and Sanderson (Ill.); 2 ♂♂, 1 ♀, Mt. Carmel, July 3, 1906 (Ill.); 1 ♀, Dubois, July 13, 1948, Sanderson and Stannard (Ill.). IOWA: 1 ♀, Elmo (NYSM); 1 ♂, 1 ♀, Henry Co., July 6-27, 1949, D. Millspaugh (Iowa). MARYLAND: 5 ♂♂, 4 ♀♀, Glen Echo, June 23, 1929, J. C. Bridwell, on *Hypericum prolificum* (USNM). MASSACHUSETTS: 1 ♂, Framingham, June 26, 1915, Frost (Frost). MISSOURI: 4 ♂♂, 9 ♀♀, Columbia, May 29, 1932, T. E. Birkett, on *Hypericum prolificum* (USNM). NEW YORK: 1 ♂, Pike, (NYSM). NORTH CAROLINA: 1 ♀, Raleigh, September 11, 1952, D. M. Weisman (Weisman). OHIO: 3 ♂♂, 2 ♀♀, Greene County, July 17, 1947, Wilcox (W); 2 ♀♀, Hocking County, May 23, 1946, Wilcox (W, USNM); 1 ♀, Oxford, June 30, 1950, D. H. Weisman (Weisman). PENNSYLVANIA: 1 ♂, 2 ♀♀, Andorra, June 27, 1921, E. A. Hartley (W). VIRGINIA: 6 ♂♂, 5 ♀♀, Lignum, June 27, 1947, Bridwell, on *Hypericum* (USNM).

Hosts. St. Johnswort (*Hypericum* spp.). Also reported on goldenrod (*Solidago* sp.) and basil (*Pycnanthemum* sp.).

P. sellata has a rather distinctive appearance. It is larger and more evenly convex than *thoracica*, *frosti*, *barnesi* or *saliceti*. The form of the aedeagus and last ventral segment of the male will also separate it from the last three of these. Paler specimens are similar to typical *canella* but are much more distinctly alutaceous and the more reddish orange color of the pale areas gives it a different appearance. Both Blatchley and Barber had recognized this as a valid species. While most of the records list *Hypericum* as the host, I swept a large series from *Solidago*. I did not notice whether or not *Hypericum* was present in this locality.

The specimen from Cambria, Ill., on *Pycnanthemum* (basil), probably is *sellata* but it is small and nearly entirely pale. The dark elytral markings are very faint. It does have obsolete elytral margin.

15. *Paria canella* (Fab.)
(FIGURES 4, 32, 40)

Cryptocephalus canellus Fabricius, 1801:52

Metachroma robusta Blatchley 1924:168, new synonymy

Robust, convex, elytra tumid at middle. Color orange yellow; dark marking as in color form 4, spots may be absent; tibiae, tarsi and apical antennal segments dark brown or black. Punctuation of vertex fine. Clypeus alutaceous or smooth; punctures fine. Ocular sulcus above eye moderately close to eye, more than one-half width of facet. Frontal suture not impressed; coronal suture impressed. Emargination of eye without depression. Pronotal punctuation very fine or absent; surface may be smooth or alutaceous. Elytral punctures moderate; striae not impressed; surface smooth shining. Ridge between elytron and epipleura reaching apex. Front femur without tooth; hind femur with tooth. Posterior tarsal claws with inner lobe short, about half as long as outer lobe. Aedeagus with lateral apical lobes large, nearly as long as median lobe; median lobe short, broad. Length: 4.3-4.4 mm., width 2.2-2.3 mm.

Range. Carolina, Florida.

Types. The type of *C. canellus* collected by Bosc in "Carolina" probably near Charleston, S. C., is presumed to be lost. The female type of *M. robusta* Blatchley, Fort Davis, Fla., April 20, 1912, W. T. Davis, is type number 7 in the American Museum of Natural History.

Other localities. FLORIDA: 2 ♂♂, Highlands Hammock, May 5, 1953, N. J. and E. L. Sleeper (W); 2 ♀♀, Enterprise, May 26, Hubbard and Schwarz (USNM); 1 ♂, 2 ♀♀, Haw Creek, June 10, Hubbard and Schwarz (USNM); 2 ♂♂, 2 ♀♀, L. Ashby, June, Hubbard and Schwarz (USNM); 1 ♀, Hillsboro County, May, Hubbard and Schwarz (USNM); 1 ♀, Ft. Myers, May 3-5, 1908, Van Duzee (USNM).

Host. Unknown.

Barber, in his manuscript, states that "this first described species in the genus seems not to have been correctly cited in our literature unless by Blatchley, in 1924, whose samples I have not seen. It is however, represented by several old specimens from Florida collected by Hubbard and Schwarz in 1875 and later (Lake Ashby, Enterprise, Hillsborough Co., Haw Creek prairie). These agree perfectly with the original description. The types were from Carolina collected by Bosc, probably near Charleston. New topotypic samples in alcohol are desirable. Its habits and preferred native host plants should be observed....

"Compared with other species, *canella* is larger, and wholly dark reddish yellow except two pair of elytral spots which are sometimes

evanescent, the sutural interval, and tips of legs and antennae also somewhat infuscate. The aedeagus is parallel-sided, truncate and strongly trilobed at apex, the outer lobes only very slightly shorter than the one in the middle.

"No specimen of the true *canella* is known to me from strawberry. Samples submitted as from strawberry are always an unpleasant problem in identification, to understand which, one should realize that clean culture in strawberry beds drives any survivors from the preceding fallow condition of the area onto this plant on which tender foliage palatable to various species is present through the growing season. The sources of these attacks seem not to have been well-considered."

16. *Paria aterrima* (Oliv.)
(FIGURES 15, 33)

Eumolpus aterrimus Olivier, 1808:913

Robust, convex. Entirely black. Head, pronotum, legs and ventral surface sometimes very dark reddish brown. Punctuation of vertex fine or moderate. Clypeus alutaceous, punctures fine. Ocular sulcus above eye moderately close to eye. Frontal suture not impressed; coronal suture impressed. Emargination of eye with depression, pronotum alutaceous, dull; punctures fine or absent. Elytra evenly convex, not tumid at middle; very faintly alutaceous; punctures moderate, close; striae may be impressed. Ridge between elytron and epipleura reaching apex. Front femur without tooth; hind femur with tooth. Posterior tarsal claws with inner lobe short, one-half length of outer lobe. Aedeagus with lateral apical lobes large, nearly as long as median lobe; median lobe narrow. Length: 3.8-4.4 mm., width 2.3-2.5 mm.

Range. Long Island, N. Y., to Florida.

Type. Collected by Bosc in "Carolina" probably near Charleston, S. C. It is presumed to be lost.

Other localities. FLORIDA: 3 ♂♂, 4 ♀♀, Baker County, May 6, 1953, N. J. and E. L. Sleeper (W). NEW YORK: 4 ♂♂, 5 ♀♀, North Sea, Cow Neck, Long Island, July 18, 1956, Wilcox, on *Iva frutescens* L. (NYSM).

Host. *Iva frutescens* L.

H. S. Barber, in his manuscript notes, discussed the name *aterrima* as follows. "The types of this species were collected by Bosc in Carolina, probably near Charleston, but a proper sample from this locality is not available. Melanic individuals resembling and often labeled *aterrima* appear in colonies of *quadrinotata* and several other species which normally are more or less pale. The writer's concept of this species is based upon experiences long ago in the salt marshes on

both sides of Chesapeake Bay when the *Baccharis* or *Iva* bushes (not then distinguished) were heavily infested with a large glistening black species of *Paria* which sat so tight on the leaves that many mating pairs were gathered with thumb and finger. Such broods have not since been observed and the black species which I have seen on *Solidago maritima* on Long Island is of a different habitus."

P. aterrima is very close to *thoracica* in appearance. However, the range and form of the elytral margin will usually indicate to which species a specimen belongs. *P. aterrima*, with complete marginal bead of elytra, is found along the Atlantic coast. A similar form of marginal bead is found in *thoracica*, but, judging from the specimens examined, only in the Mississippi drainage basin and not in the eastern United States.

SPECIES REMOVED FROM *PARIA*

Typophorus pumilus (Leconte), new combination
(FIGURES 1 and 35)

Paria pumila Leconte, 1859:23

Study of the type specimen of *Paria pumila* Leconte shows that it is not a true *Paria*. Although authors have erroneously applied the name *pumila* to any entirely yellow or brown specimens of *Paria*, the type is similar to several tropical American species of *Typophorus* and must take its place with them. I therefore propose the new combination *Typophorus pumilus* (Leconte).

The type (M.C.Z. type 4317) from Kansas is the only specimen of the species known. Since I have examined several hundred *Paria* from Kansas and surrounding areas, I suspect Melly's Kansas locality may be erroneous.

T. pumilus looks like a small (2.5 mm.), robust *Paria* but differs from any species in that genus by the form of the ocular sulci which join in front and become very wide above the eyes. It is dark reddish brown, the metasternum slightly darker. Pronotum and elytra are smooth, shining and very finely punctate.

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PLATE 1

Color patterns found in *Paria*. The color pattern or color form numbers listed in the key and text refer to the figure numbers on this plate.

1. *Typophorus pumilus* (Lec.)
2. *Paria sexnotata* (Say)
3. *Paria scutellaris* (Notm.)
4. *Paria canella* (Fab.)
5. *Paria opacicollis* Lec.
6. *Paria quadriguttata* Lec.
7. *Paria fragariae* Wilcox
8. *Paria quadrinotata* (Say)
9. *Paria quadrinotata* (Say)
10. *Paria sellata* (Horn)
11. *Paria sellata* (Horn)
12. *Paria quadriguttata* Lec.
13. *Paria scutellaris* (Notm.)
14. *Paria thoracica* (Melsh.)
15. *Paria aterrima* (Oliv.)

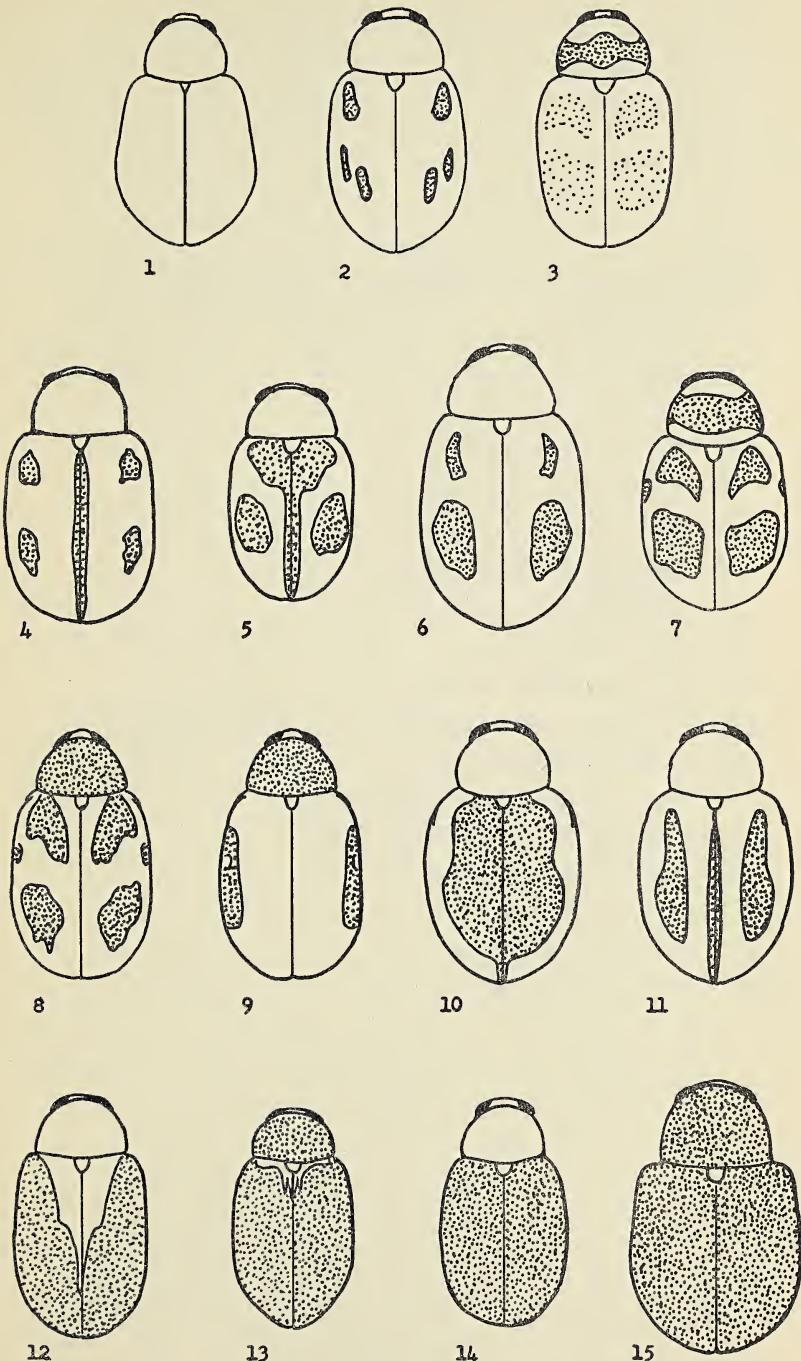


PLATE 2

Aedeagi, apical view on left, lateral view on right.

16. *Paria frosti*, n. sp.
17. *Paria barnesi* n. sp.
18. *Paria quadriguttata* Lec.
19. *Paria sexnotata* (Say)
20. *Paria juniperi* Blatch.
21. *Paria blatchleyi* n. sp.
22. *Paria quadrinotata* (Say)
23. *Paria fragariae* Wilcox
24. *Paria virginiae* n. sp.
25. *Paria scutellaris* (Notm.)
26. *Paria opacicollis opacicollis* Lec., from Karner, N. Y.
27. *Paria arizonensis* n. sp.
28. *Paria opacicollis opacicollis* Lec.
29. *Paria opacicollis wenzeli* n. subsp.
30. *Paria thoracica* (Melsh.)
31. *Paria sellata* (Horn)
32. *Paria canella* (Fab.)
33. *Paria aterrima* (Oliv.)

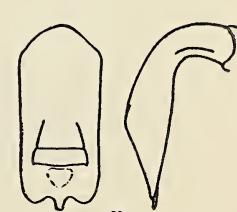
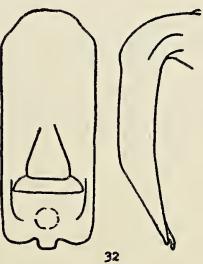
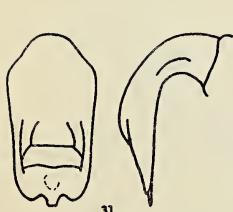
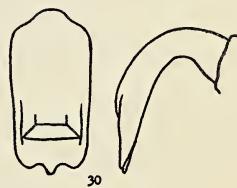
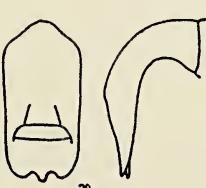
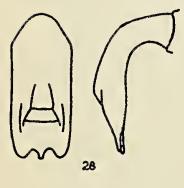
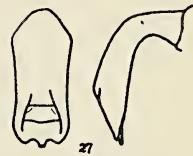
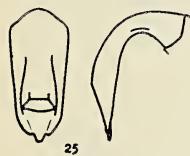
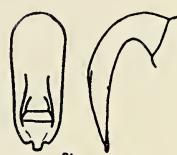
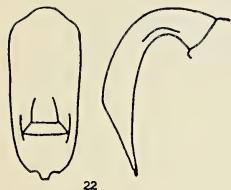
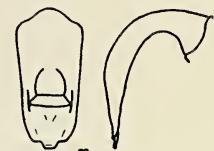
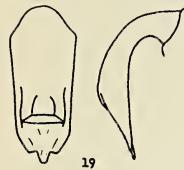
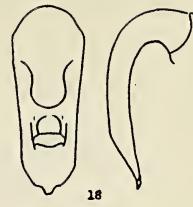
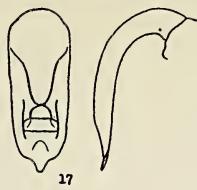
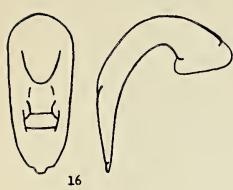
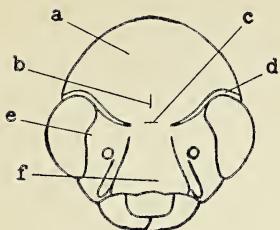
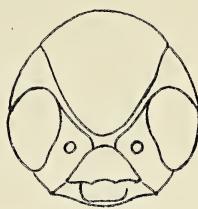


PLATE 3

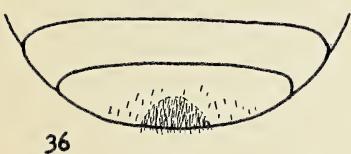
34. *Paria scutellaris* (Notm.), frontal view of head
 - a. vertex
 - b. coronal suture
 - c. frontal suture
 - d. ocular sulcus
 - e. emargination of eye
 - f. clypeus
35. *Typophorus pumilus* (Lec.), frontal view of head
36. *Paria sellata* (Horn), last ventral abdominal segments
37. *Paria scutellaris* (Notm.), last ventral abdominal segments
38. *Paria quadrinotata* (Say), posterior leg
 - a. femoral tooth
 - b. apical emargination of tibia
39. *Paria virginiae* n. sp., posterior tarsal claws
40. *Paria canella* (Fab.), posterior tarsal claws
41. *Paria quadrinotata* (Say), posterior tarsal claws
42. *Paria sellata* (Horn), lateral view
 - a. frontal sulcus
 - b. postocular lobe of pronotum
 - c. marginal bead between disc of elytron and epipleuron
 - d. disc of elytron
 - e. elytral epipleuron
43. Network of fine grooves typical of an alutaceous surface



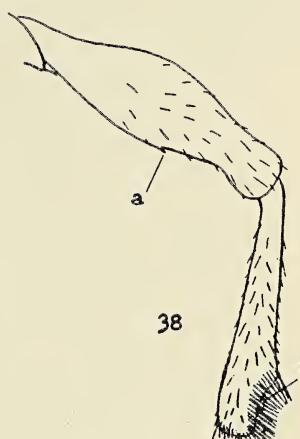
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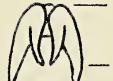
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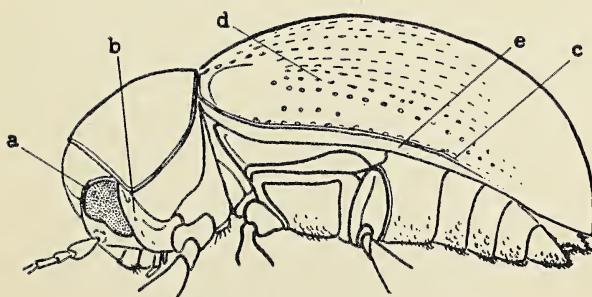
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